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Technological Achievements and the Future Army,

by

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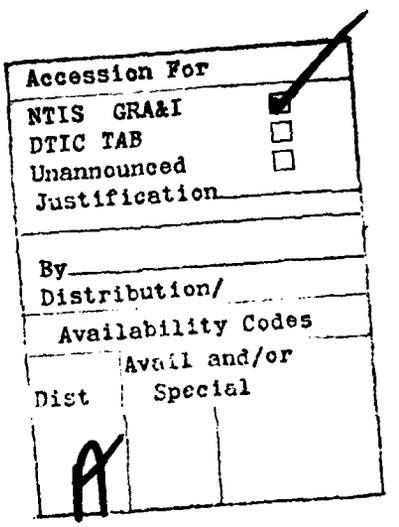
DISCLAIMER

The views, opinions, and/or findings contained in this report are those of the author and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other official documentation.

ABSTRACT

This paper lists a large number of possible technological achievements which might come about by the year 2000 and which have potential military application. The descriptions of the possible achievements are brief summaries. They provide some scope to the breadth of possible technological achievement and should stimulate thought concerning military application.



FOREWORD

This paper presents brief descriptions of possible technological achievements which could have significant implications for the US Army in the future. These lists are the result of the author's extensive reading of futurist materials and his own research. These lists provide a challenge to those concerned with how best to counter existing military threats.

This report was prepared as a contribution to the field of national security research and study. As such, it does not reflect the official view of the US Army War College, the Department of the Army, or the Department of Defense.

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TECHNOLOGICAL ACHIEVEMENTS AND THE FUTURE ARMY

Technology is the practical application of scientific discovery, usually for the purpose of extending human capabilities. Technological achievements not only allow man to adapt to his natural environment but also to his economic, social, and political environments as well. This paper considers some of the technological achievements that will come into being by the turn of the century which will impact on that element of the political environment involving military requirements. Impact assessments of the military-related technological achievements cited in this paper would aid Army long-range planners to project force structure, combat capabilities, and equipment and personnel requirements best suited for the types of conflict situations which might occur toward the year 2000.

Army planners can look forward to force structures based on technology. They can anticipate combat capabilities that will far exceed those of the 20th century. They can expect military equipment that will be more durable and efficient and which, in all likelihood, will be recyclable and, where practicable, will be disposable and biodegradable. Military personnel requirements will call for highly intelligent, rugged and healthly individuals capable of mastering the operational techniques of a technologically-oriented Army. Military operational systems of the 1990's and 2000's can be expected to be inherently more efficient and flexible. Weapon systems can be envisaged as more lethal or selectively incapacitating depending on the type of mission or conflict. Technological advances by the year 2000 will have improved in some way each of the following combat functions: firepower, mobility, intelligence, service support, and command, control, and communication.

The technologies most associated with military applications are shown below with subelements:

Power Technology	Electronics Technology
Energy sources	Communication
Explosives	Avionics
Propulsion systems	Computer & data systems
	Bionics
Materials Technology	**Weapons Technology**
Design	Nuclear
Construction	Conventional
Composition	Chemical
	Biochemical
Space Technology	**Support Technology**
Satellites	Logistics
Spacecraft	Biotechnology
Lunar and extra-terrestrial systems	Medical technology
Management Technology	
Command and control	
Systems design	
Systems analysis	

Some of the technological achievements that will come into being by the year 2000[1] are listed and described briefly in Tables 1 through 7 along with the military functions which will be best accommodated. The entries are not meant to be all inclusive but are representative of the technological achievements which, theoretically, can be developed from the scientific discoveries that possibly will occur over the next two decades. Planners should be aware, however, that any projected technological advance could be altered by technological surprise or obsolescence, miscalculation, scientific breakthroughs, security leaks, or preemptory foreign achievements of countersystems.

1. The technological achievements described in this paper have been derived from combination, adaptation, and innovation from suggestions found in the source documents listed in the bibliography.

Description	Military function
Compact, high-energy conversion units are available to supply electrical power and are replacing conventional electrical generator systems. Units have high storage and rapid battery recharge capability.	Mobility, service support
*Modular subterranean vehicles burrow at a speed of 25 feet per hour (depending on soil and rock formation) for four hours before refueling; create a ceramic-lining-effect on tunnel walls from disintegrated rock and soil for an underground facility. Operator can communicate with surface and air units with deep-strata communications equipment.	Mobility, service support
*Effective and reliable energy conversion, transfer, and extended energy-storage units such as the following are available: thermionic units performing for greater than six years at temperatures up to 4,000°F.; thermoelectric elements, operating for two years up to 2,000°F.; and photoelectric units for long-term operation in vaccum and radiation environments. Systems convert thermal energy directly into electric power.	Mobility, service support
Hypersonic intercept fighter aircraft which travel at speeds approaching MACH 20, are capable of orbital flight and can land on 600 meter runways under all weather conditions.	Fire power
Individual lift and self-propulsion units operating by fuel cells or solid propellants are capable of transporting a man with full equipment 10 km at speeds up to 25 knots. Units are lightweight, cartridge rechargeable, and have speed and direction controlled by body movement and foot/leg attachments.	Mobility

*This advance, in part or in total, might occur later than the year 2000.

Table 1. Achievements in Power Technology

Description	Military function
Photogrammetric, self-compensating scanner operates remotely from land, air, or space by sending electromagnetic signals to an automatic mapper which translates message into object size and terrain altitude for permanent display or full color, three dimensional, real-time topographical maps.	Intelligence, Fire power
Nondetectable, submerged sensing devices can be emplaced in strategic ocean areas to detect the presence of unnatural moving, surface and submerged objects in a wide radii.	Intelligence
Electrical and magnetic field protection systems are being tested for communications equipment vehicles.	Communication
Wide-beam electromagnetic-wave avoidance devices detect airborne objects to avert aerial collisions; also detect storm areas to avoid adverse weather conditions during near-earth flights.	Mobility
High reliability, long-life, maintenance free, jamproof, micro-electronic, miniature transceivers capable of transmitting secure voice messages up to 20 km are available.	Communication
Worldwide, secure, integrated satellite/earth sensor and communications systems are linked directly into computer display systems which analyze and evaluate input information greatly assisting in the decisionmaking process at command centers.	Command, control, communication
Satellite relayed video/voice messages are provided by miniaturized video-transceivers at the unit level.	Command, control, communication

Table 2. Achievements in Electronics Technology

Description	Military function
Small prepackaged, foam-in-place, disposable shelters that reflect radiation and afford protection from adverse climatic conditions are available.	Service support
Lightweight, self-inflating, positive-pressure collective protection shelters are made to composite plastic/metal and are impervious to chemical and biological agents, and are radiation-proof and disposable.	Service support
Deep-ocean submerged units are developed for prestockage of vital materials.	Service support
*Two-place, lightweight, rocket-assisted tactical VSTOL retractable-wing fighter craft are designed to be watertight and capable of underwater travel at speeds up to 25 knots, up to 90 knots as a surface vessel for distances of over 100 nautical miles, and speeds up to MACH 5 as an aircraft. Craft is called SEANAIRS.	Fire power
High maneuverable, auxiliary aircushion vehicles, called LEAF HOPPERS, are silently propelled by fuel cells or electric drives, have an optional modular system, and are constructed of lightweight metal/alloy composite. Body and observation ports are resistant to heat, high impact and shock, and deflect metal objects. Vehicle can carry 10 men and is equipped with high-contrast night vision viewers.	Service support, Fire power

*This advance, in part or in total, might occur later than the year 2000.

Table 3. Achievements in Materials Technology

Description	Military function
Jam-proof, electronically controlled, long-range miniature drones can supply light from rocket motor combustion for battlefield illumination.	Fire power
*An operator-safe, vehicle-mounted, sonic beam weapon at low power can cause temporary psychosis, convulsions, and muscular spasms in people, is lethal at high power and can shatter metal, rock, plastics, and other solids.	Fire power
A new nonlethal riot gas causes temporary disorientation or confusion and motivation change in people.	Fire power
Rapid setting, aerosolized viscous chemical, expansion-foam spray can be used for immobilizing vehicles, weapons, or personnel. Dispersal devices can be hand-carried or vehicle-mounted for land or air delivery.	Fire power
Small area weather modification devices can be mounted on aerial craft and can alter weather over 50 sq. km under specific atmospheric conditions.	Fire power
*A variety of low-kiloton, reduced radiation nuclear weapons are developed for a number of different tactical delivery systems down to small-vehicle mounted devices which also deliver fractional-kiloton munitions.	Fire power

*This advance, in part or in total, might occur later than the year 2000.

Table 4. Achievements in Weapons Technology

Description	Military function
Manned, orbiting spacecraft designed specifically for a military command function monitors and directs all military activity in operation on land, sea, or above the earth.	Command and control
*Optionally manned or unmanned, orbiting spacecraft performs all communications of a military nature by secure systems and can operate through any adverse, earth weather conditions or through intense ionospheric disturbances. Additional functional systems include meterological, navigational, mapping, and geodetic systems.	Communication
*Manned, orbiting hospital and rehabilitation or rest center provide research, care for the ill, and specialized surgical laboratories using a variety of simulated conditions beyond zero gravity.	Service support
Manned, orbiting maintenance depots providing "space garage" for servicing spacecraft. Depot is equipped with individual operator space vehicle to take service and repair to spacecraft in other orbits.	Service support

*This advance, in part or in total, might occur later than the year 2000.

Table 5. Achievements in Space Technology

Description	Military function
*Hypersonic transport air/spacecraft can carry 500 personnel or up to 100 metric tons, can travel at speeds approaching MACH 10, and are capable of orbital flight and return to earth for unassisted landings on 2,000 meter runways.	Mobility, Service support
Improved all-weather, VSTOL vehicles use energy conversion units or fuel cells and are capable of transporting up to 50 metric tons or up to 250 personnel distances of 5,000 nautical miles at MACH 1.	Mobility, Service support
*High speed, all-weather, assault/transport vehicles (LEAP FROGS) propelled by fuel cells have auxiliary ground effects application can travel at speeds up to 200 knots at 2 to 200 meters above land or water. Vehicles can travel about 200 nautical miles before refueling at energy storage depots, have an optional tandem system, and can carry 10 metric tons or up to 100 personnel.	Mobility, Service support
Rapid logistic response is achieved through missile delivered package such as replacement of unit equipment (rather than parts), medical supplies, or prepackaged, durable inflatable buildings.	Service support
Human parts bank, synthetic blood plasma, and bioelectrically controlled prosthetic devices increase survival of injured personnel.	Service support
Subsistence of personnel is maintained by continuous belt high-speed cafeteria-type system with precooked, frozen or irradiated foods reheated by microwave. System is mobile as individual unit or modular field mess. A flash treatment process provides pure and demineralized water. Personnel carry a compact 2-week emergency food kit which is light weight and contains concentrated chemically pure food with added substances to offset stress and increase alertness. An emergency water kit provides means to purify water rapidly from locale, vegetation, or natural wastes.	Service support

*This advance, in part or in total, might occur later than the year 2000.

Table 6. Achievements in Support Technology

Description	Military function
*Deep ocean-floor offshore defense installations are emplaced for specific types and phases of personnel activities and training to avoid aerial and space observation. Subterranean installations are constructed for the same purposes.	Service support
*Submersible, floating installations are used throughout the ocean areas for stationing personnel to replace overseas land bases and for hospitals, rest areas, and command centers.	Service support
Advanced computer equipment and management techniques allow an accelerated program and updating of sociological, political, economic, military, scientific and technical information of the nations of the world, especially the lesser nations, enabling planners to have greater reliability in projecting the stability of the world environment.	Command and control,

*This advance, in part or in total, might occur later than the year 2000.

Table 6. Achievements in Support Technology

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This paper lists a large number of possible technological achievements which might come about by the year 2000 and which have potential military application. The descriptions of the possible achievements are brief summaries. They provide some scope of the breadth of possible technological achievement and should stimulate thought concerning military application.

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